

Hail fell on only 5 days throughout the whole period. Rain can fall only from May to October, and July has the greatest number of rainy days, also it is the month which gives rise to the greatest amount of fog. Very considerable care was taken to determine the temperature of the Polar ice, but, naturally, much difficulty was experienced in recovering the thermometers from the bore-holes, in which they might be frozen fast, while during the summer, the viscous ice would close round them, requiring the thermometers to be dug out. Neither is it easy to remove the sources of error from the observations, especially from the effects of brine contained in the ice, which was apt to fill the bottom of the holes even during the coldest season, whilst during the summer all the holes were filled with briny or saline water, the salinity of which decreased inversely as the temperature. This brine percolated from a different level to that in which the thermometer was placed. In the winter time the temperature of the ice increased from the surface downward, and therefore the brine at the bottom of the hole was probably of too low a temperature. On the other hand, in the summer time, the ice near the surface was warmer than that lower down, and the brine would be less saline, and consequently lighter in the upper layers than in the deeper, so that in the summer time the temperature reading would again be too low. The result drawn from the observations is that the surface of the ice, in all months with the single exception of June, is warmer than the air. The difference is greatest in December, amounting to 16° F. The surface of the ice, being covered, except during a short time in summer, with snow, is protected from cooling by radiation upwards, and receives heat from the underlying warmer layers. This, no doubt, is the main factor in the explanation, though other causes are suggested by Prof. Mohn.

The book contains also an account of the meteorological observations made during the sledge expedition to Franz Josef Land in 1895-6. From this account we can quote only one remark, which illustrates the determination of the leader of the expedition to secure an unbroken series of observations.

"We had no lantern for the reading of the thermometer, and I tried in vain to construct one, which would not burn more oil than we could afford to use. But our eyes of course became gradually trained to see in the dark, and even in mid-winter, with no moonlight, there was so much light reflected from the snow that the column of the darkly coloured Metaxylol was dimly visible, and also the figures of the thermometer scale, but not the division marks."

Dr. Nansen therefore apologises for the absence of the decimal reading, which is missing about the time of new moon. The interest of the book is necessarily largely centred in the fact that the crew of the *Fram* laboured so diligently and so well to overcome the difficulties that were imposed upon them by the situation in which they were placed. To go up to the crow's nest to take additional readings of the instruments in dark, wintry weather seems to have been a source of positive enjoyment to those who took part in these observations.

NO. 1864, VOL. 72]

EUROPEAN AND ASIATIC GEESE.

The Geese of Europe and Asia. By Sergius Alpheraky. Pp. viii+198; 24 plates. (London: Rowland Ward, Ltd., 1905.) Price 3l. 3s. net.

AT the present day most works on ornithology of a general character are of little permanent value because the broad outlines of the northern fauna have already been adequately dealt with. What we want, and what we so seldom see, are complete life-histories of separate groups of birds, adequately illustrated and described by ornithologists who are both well acquainted with them in the field and are capable of summarising their labours in an accurate scientific account. To do this a very large series of birds must be collected, examined and digested, and this means years of travelling and study with little monetary reward as the result. Nevertheless, the works of such men are of great and permanent value, although their costly nature must ever be a constant drawback to the producer. No good form of colour printing is cheap, and as this is a *sine qua non* in works of this kind, the results can only pass into the hands of a public "fit but few."

The latest of these monographs is that of "The Geese of Europe and Asia," by Mr. S. Alpheraky, and the Russian naturalist is to be congratulated in giving us the first detailed account of this interesting and, we may say literally, confusing group of birds. It is an admirable treatise, full of research in field and museum, and the work of one who has carefully studied the subject from all points of view. There are twenty-four coloured plates by Mr. F. W. Frohawk, which are unfortunately only moderately successful. Twenty-one of these represent the different kinds of geese described by the author, and for the most part the lithography is weak and hard, and evidently does not do justice to the artist's careful work; whilst the three plates representing the bills of four various kinds are excellent, and will be of the greatest use both to sportsmen and naturalists in the determination of species. The frontispiece to the work represents the assemblage of white-fronted and red-breasted geese on a sandspit, and is from the brush of Dr. Sushkin. The idea of movement exhibiting the various attitudes into which these birds throw themselves is very fairly represented, but the technical work of painting and the drawing of some of the wings, as well as the general composition, leave much to be desired. It seems a thousand pities that chromolithography is a dying art, and that no firm in Europe is capable of turning out first-class work except W. Greve, of Berlin. For all we know, these drawings by Dr. Sushkin and Mr. Frohawk may have been soft and truthful representations of nature, but here we only see hard and black lines such as nature never shows.

Mr. Alpheraky is evidently a keen sportsman as well as a good naturalist, and he rightly holds a high view of the remarkable intelligence of this class of birds.

"Geese," he says, "afford one of the most difficult kinds of fowling. However cunning man may be, he

finds it extremely difficult to over-reach these wary birds, and in some places one may see them in hundreds of thousands for several weeks at a stretch without the possibility of securing a single specimen. This is especially the case in thickly populated regions, where the geese already know that danger may threaten them."

By this we know that the writer has toiled and suffered many disappointments. In certain British waters where for three seasons Brent geese were abundant we never obtained more than one good shot with the punt gun in a season. This was generally at the commencement, when the birds arrived in late October. After this date we could only "look" and "long." Other species are equally cunning.

The key to genera, species, and subspecies with which the author furnishes us is an excellent compilation, although he does not make clear the difference between species and subspecies. For instance, it appears that full specific rank is accorded to *Branta bernicla*, *Branta bernicla glaucogaster*, and *Branta bernicla nigricans*, the three varieties of the Brent goose which visit our shores. If those which are furnished with trinomial names are intended to be subspecies, and it is a very doubtful point if they deserve even this distinction, the author should say so in his table. Personally we do not think that there is any reason for separating these three well marked varieties. We have killed all three from one flock, and visitors to the northern breeding-places of these birds have also found all three, as well as intermediate forms, breeding together on the same ground. If such splitting were to come into general use, endless new subspecies must be created amongst the goldfinches, crows, skuas, &c., and many other birds we could mention the slight local peculiarities of which afford small points of distinction. Neither is the author consistent in this respect, for he refuses to recognise "two geographical races, much less two species," of grey geese living in eastern and western areas, and also the American and European forms of the white-fronted goose as distinct. With regard to the bean goose, Mr. Alpheraky recognises three distinct races, *A. segetum*, the common bean goose, *A. arvensis*, which possesses white feathers at the base of the bill, and the eastern bean goose, *A. serrirostris*, a bird described by Swinhoe, which is larger, distinguished by its more massive bill. Another species closely allied to the last named, namely, *A. mentalis*, but which was first described by Przewalski in 1876, seems to be of very doubtful rank, and may be only a large form of the Siberian bean goose.

In this excellent monograph the author gives us all we wish to know about the difference of sexes, gradual growth from nestling upwards, plumage variation, moulting, local names, chase, and colour of the soft parts, the latter, perhaps, the most important point of all in the determination of species. Many excellent outline figures of the bills are also given, so that the reader has no difficulty in recognising the differences of the various races even if he feels inclined, as he must sometimes do, to question the necessity of specific separation.

NO. 1864, VOL. 72]

To the oologist, too, the table and descriptions to be found on pp. 185-190, furnished by Mr. G. F. Göbel, are of the most exact and comprehensive nature, and the book is one that every working naturalist or wild-fowler should possess in his library, for it is by far the best work that has as yet appeared on this interesting family of birds. J. G. M.

THE ELECTRIC FURNACE.

Le Four Électrique: son Origine, ses Transformations et ses Applications. By Adolphe Minet. 1er Fascicule. Pp. 76. (Paris: Librairie Scientifique, A. Hermann, 1905.) Price 5 francs.

THE application of electric heating to various metallurgical and other industries has of late been making very rapid progress. The time seems, therefore, to be well chosen for examining the various stages of development which the electric furnace has passed through.

M. Minet has taken great pains to collect together as much as possible of the available information, and has certainly succeeded in producing an interesting study. Chronologically, he divides his subject into three periods:—(1) laboratory furnaces (1808-1886); (2) industrial furnaces (1886-1890); (3) development of the industrial applications of the electric furnace from 1890 to the present day. The furnaces themselves are classified in nine groups, according to the function of the current and the method of its application. Any historical treatment of such a subject as this, which expects to be generally recognised as authoritative, demands very great care and judgment in its preparation. The present review certainly promises to be the most complete which the electric furnace has yet received.

It is, however, not so clear that the author has succeeded in accentuating just those developments which have been of the greatest influence to the general progress. There are no doubt difficulties in deciding between two such different claims as those of a brilliant invention and of a painstaking scientific investigation. The successful historian must, however, accurately estimate the value of each and decide on the relative merit according to the influence exerted by each upon subsequent development.

The classification of electric furnace processes is complicated, not only by the large number of separate cases which have to be considered, but more especially by the very different purposes for which the electric current is applied. In the first place it is necessary to distinguish between the purely electrothermal and the electrolytic functions of the current. The latter case embraces all such electrolytic methods as are carried out at a moderately high temperature. Here the electric current serves the double function of maintaining the necessary temperature and separating by electrolytic decomposition one or more of the constituents of the materials treated in the furnace.

During recent years the most extensive developments in electric furnace work have centred around the production and application of extremely high temperatures. The direct results of the scientific and